If you are using a printed copy of this procedure, and not the on-screen version, then you MUST make sure the dates at the bottom of the printed copy and the on-screen version match.
The on-screen version of the Collider-Accelerator Department Procedure is the Official Version.
Hard copies of all signed, official, C-A Operating Procedures are kept on file in the C-A ESHQ Training Office, Bldg. 911A.

C-A OPERATIONS PROCEDURES MANUAL

7.1.16 Heat Exchanger 1B/2B Online and Heat Exchanger 1A/2A Offline

Text Pages 2 through 5

Hand Processed Changes

HPC No.	Date	Page Nos.	Initials

Approved: _____***Signature on File***_____ _____
Collider-Accelerator Department Chairman Date

S. Sakry

7.1.16 Heat Exchanger 1B/2B Online and Heat Exchanger 1A/2A Offline

1. Purpose

This procedure provides instructions for placing heat exchanger 1B/2B online and taking heat exchanger 1A/2A offline. This procedure will be performed when heat exchanger 1A/2A is contaminated and being taken offline for regeneration. The steps necessary to regenerate heat exchanger 1A/2A are not covered under this procedure, please reference C-A OPM 7.1.17.

2. Responsibilities

2.1 The Shift Supervisor, or an Operator designated by the Shift Supervisor, is responsible for conducting the procedure and providing documentation in the Cryogenic Control Room Log and in the Cryogenic Valve Log.

2.2 Should a problem arise in the process of switching heat exchangers, the Shift Supervisor shall report to the Technical Supervisor for instructions before continuing.

3. Prerequisites

3.1 The Operator shall be trained by the Shift Supervisor.

3.2 Operator shall be familiar with the refrigerator P&ID drawing 3A995009, the physical location of components on the refrigerator, and the refrigerator control pages found on the CRISP control system. Valves and equipment mentioned in this procedure will be found on drawing 3A995009.

3.3 Heat exchanger 1B/2B regenerated per C-A-OPM 7.1.18, "Regeneration of Heat Exchanger 1B/2B". Heat exchanger 1B/2B is clean and ready for service if low pressure outlet valve and high pressure inlet valves are open.

3.4 Oxygen monitor and hygrometer in compressor room are set to read compressor discharge.

4. Precautions

4.1 If there is liquid helium in the refrigerator pots, all personnel entering the refrigeration wing of 1005R must be ODH Class 1 qualified, have a Personal Oxygen Monitor (POM), and carry an emergency escape pack.

5. Procedure

_____ 5.1 Date _____

_____ 5.2 Ensure closed DP instrument valve H712M.

_____ 5.3 Ensure open DP instrument valves H842M_____ and H821M_____.

_____ 5.4 If during this procedure, any sustained increase in dew point at compressor discharge appears, stop this procedure and regenerate heat exchanger as per C-A-OPM 7.1.18.

_____ 5.5 Crack open valve H713M to begin the cool down of heat exchanger 1B/2B.

_____ 5.6 Monitor the temperature of running warm turbine train. If in Auto, turbines should compensate as necessary.

_____ 5.7 Monitor heat exchanger inlet temperature sensor TI704. Also monitor TI968, TI969, and TI970 on low pressure side of heat exchanger 1B/2B. The desired temperature drop is 5°K/15 minutes on the heat exchanger sensors, while the inlet temperature to the running turbine train is maintained.

_____ 5.8 When sensors TI708, TI709, and TI710 on high pressure side of heat exchanger 1B/2B come within 10°K of sensors TI308, TI309, and TI310 located on the high pressure side of heat exchanger 1A/2A, crack open valve H714A.

_____ 5.9 Monitor TI210, and if it increases by more than 10°K in 15 minutes, throttle back valve H714A.

_____ 5.10 When TI210 returns to its initial temperature, slowly open valves H713M _____ and H714A _____ at the same rate. Monitor adsorber temperature (should stay below 90°K), and compressor suction temperature (should stay above 260°K).

_____ 5.11 Crack open valve H724M.

_____ 5.12 Monitor the inlet temperature of running warm turbine train (TI334 on turbine train A, TI734 on turbine train B). If the inlet temperature increases by more than 5°K, adjust valve H724M until the inlet turbine temperature becomes stable.

_____ 5.13 Open valve H724M fully when the inlet turbine temperature becomes stable.

_____ 5.14 Close valve H324M.

_____ 5.15 Monitor the inlet temperature of running turbine train (TI334 on turbine train A, TI734 on turbine train B). If the inlet temperature increases by more than 5°K, reopen valve H324M.

_____ 5.16 If valve H324M has to be reopened, repeat above two steps as necessary until the inlet temperature of the running turbine train is stable with valve H324M fully closed.

_____ 5.17 When valve H324M remains fully closed, close the following valves on heat exchanger 1A/2A:

H314A_____ H315M_____ H316M_____ H317M_____ H313M_____

_____ 5.18 Vent the high pressure side of heat exchanger 1A/2A down to 10 atmospheres, as read on PI844H thru valves H319M, H321M and H323M.

_____ 5.19 If heat exchanger 1A/2A was taken offline due to contamination, start regeneration process as specified in C-A OPM 7.1.17.

6. Documentation

6.1 The check-off lines on the procedure are for place-keeping only. The procedure is not to be initialed or signed, it is not a record.

6.2 The Shift Supervisor shall document the completion of the procedure in the Cryogenics Control Room Log

7. References

7.1 Drawing 3A995009, 25kw Helium Refrigerator P&ID.

7.2 C-A-OPM 7.1.17, "Regeneration of Heat Exchanger 1A/2A".

7.3 C-A-OPM 7.1.18, "Regeneration of Heat Exchanger 1B/2B".

8. Attachments

None